UCL WOBURN SQUARE

25-26 Woburn Square, London, WC1H 0AA

TREE PROTECTION METHOD STATEMENT

Executive Summary

The Site is located to the rear of 25 and 26 Woburn Square between Torrington Square and Woburn Square in Bloomsbury, London.

The rear garden areas are not currently utilised and appeared to be periodically managed but generally unappealing as outdoor space and unsuitable for staff or guests.

The rear gardens are likely to be formed of made-up ground, which is at different levels between the rear of Woburn Square and the rear outdoor areas of Torrington Square.

Only a single tree, bay (Laurus nobilis) T5 is within the Site of the 25-26 Woburn Square.

The tree on site is predominantly mature and in good condition although regularly reduced in size due to the limited available space between the buildings due to the proximity of the building (refer to Figure 1 below).

The most significant trees included in the main AIA report (appended) within the survey are the London plane both within the rear outdoor area between Woburn Square and Torrington Square and those in the Woburn Square Garden.

Figure 1: Plane Tree (T5, as per the AIA report) growing to the rear of the building

Tree Protection Measures

Barrier Tape Fencing Specification

Due to the context and scale of the Site and the considerable distance from areas of significant site works an alternative specification of fencing is to be adopted. This will comprise of hi visibility orange barrier tape fixed in place with road pins or treated wooden stakes at a maximum spacing of 4m (carefully positioned to avoid any services or significant tree roots).

An example of this style of fencing is included below.

Figure 2: example of high-visibility barrier tape fencing secured with timber stakes (as per AIA report issued)

Note: *Protective fencing and ground protection shall stay in place until all development operations have been completed and the prior consent of the LPA Tree Officer and/or an arboriculturist has been obtained.*

Guidance for the management of exposed roots

Excavation must only take place within the RPA of a retained tree with the prior agreement of an arboriculturist and the Local Authority Tree Officer. All excavation must be undertaken using hand tools or compressed air (such as an air spade).

As it is intended to undertake excavation operations within the root protection area, precautions should be taken to maintain the condition and health of the root system and in particular to:

- prevent physical damage to the roots during demolition or construction (such as by soil compaction or severing);
- make provision for water and oxygen to reach the roots;
- allow for the future growth of the root system;

- preserve the soil structure at a suitable bulk density for root growth and function (in particular for soils of a high fines content)

- Throughout the process of construction phase, including, the soil structure within the root protection area will be protected. The methods of protecting trees from damage during all phases of demolition and construction work will conform to the Tree Report

- Any excavations which have to be undertaken within the root protection area should be carried out carefully by hand (as per attached AIA) avoiding damage to the protective bark covering larger roots.

    - Roots, whilst exposed, should be wrapped in dry, clean hessian sacking to prevent desiccation and to protect from rapid temperature changes.
    - Roots smaller than 25 mm diameter will be retained where possible and may only be pruned back (following consultation with the project arborist), preferably to a side branch, using a proprietary cutting tool such as bypass secateurs or handsaws, pruning saws to leave a clean cut end (ideally 100mm back from the face of the excavation to account for future regrowth) where they pose an obstruction.

    - Roots larger than 25 mm may only be severed following consultation with an arboriculturist, as they may be essential to the tree's health and stability. Prior to backfilling, any hessian wrapping should be removed and retained roots should be surrounded with sharp sand (builders' sand should not be used because of its high salt content which is toxic to tree roots), or other loose granular fill, before soil or other material is replaced. This material should be free of contaminants and other foreign objects potentially injurious to tree roots.

- *Note: no Herbicides shall be used as part of this scheme.*

- Where levels are required to be reduced for access purposes within RPA of the tree, the work is to be undertaken under the supervision of the arboricultural consultant to allow for monitoring of root exposure.

Storage, use and mixing of materials

The use, mixing and washing of materials can lead to run off or inadvertent spillage into tree root zones. Many substances often used on construction sites can be toxic to tree roots (such as concrete, fuels, salts, builders' sand and herbicides), can result in the death of tree roots and beneficial soil organisms; and have a significant impact on the future health and appearance of trees.

The storage of materials can result in an effective raised soil level. This buries tree roots at depths where air and water are less available and can lead to the decline or death of the tree.

For these reasons the storage of materials and any washing, mixing or refuelling must take place in agreed allocated areas at least 5m from the edge of the RPA of retained trees.

Any slope effect must be taken into account and where there is a potential for run off, heavy duty polythene sheeting and sandbags must be in place as bunding to prevent toxic materials reaching RPAs.

Tree Retention - General

To carry out the refurbishment and various associated works, the construction activities require extreme and great care. As part of Ark Build PLC's scope of works, consideration needs to be given as to how our construction activities including ***erection, dismantling and storage of scaffolding materials and gardening or landscaping works*** can proceed whilst avoiding damage to retained trees.

"Damage can occur as a result of direct impact between construction equipment/ machinery and parts of a tree. Often greater damage and even destruction occurs quite invisibly due to the deformation of the soils in which the tree root. Soil stripping, trenching and compaction all have serious effects on trees and if such trees are to be successfully retained in the long term it is necessary to protect the soil during construction."

Ref: British Standard BS 5837 (2012) – 'Trees in Relation to Design, Demolition and Construction'.

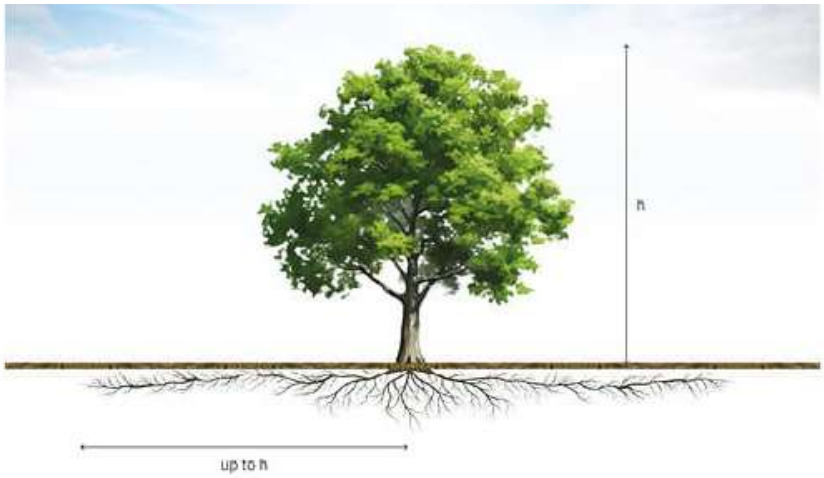
Generally, construction activities that may require establishment of RPAs will be:

- Major landscaping
- Utility installations – both above and below ground
- Trenching
- Building work
- Below ground construction
- New roads and hardstanding's
- Temporary access road
- Demolition work

For a tree to survive and thrive its root system must be able to absorb sufficient water to sustain the foliage. That could be over 1,000 litres per day for a large tree. The network of roots must also be capable of anchoring the tree to withstand massive wind forces. If the root system is damaged or restricted the tree may become unviable. Construction activity or development taking place near a tree can therefore put that tree in danger.

It is a common misconception that tree roots grow vertically down to anchor the tree and draw water and nutrients from deep below the surface. That is not the case. Tree roots are shallow growing, almost parallel to the ground, mostly within a zone of soil less than 1.0m deep. The roots radiate outward from the trunk and extend beyond the diameter of foliage to a distance equal to the height of the tree. Beyond the first few metres the roots subdivide into multiple roots less than 2-3cm in diameter. See figure below.

Common misunderstanding of tree root development.



True illustration of root tree root development.
Shallow and wide with most roots within 1.0m of the surface.

Note: Illustration not to scale

Excavation

Any excavation close to a tree, even topsoil stripping, will potentially sever roots and may impact water supply to the tree, immediately affecting the foliage. While minor root loss may not affect the tree, greater loss will result in dieback. If the excavation is over 1.0m deep, the anchorage and stability of the tree may be affected.

Compaction

Soil compaction can arise from construction traffic operating directly over the ground or as a result of surcharge from new construction. Tree roots need oxygen to survive. Without it, the roots cannot function. If starved of oxygen for several days the roots will begin to die back. The supply of oxygen to the root system relies on pores between soil particles. Compaction of the soil from construction activity will reduce porosity of the soil and restrict the oxygen supply. Any activity causing soil compaction within an RPA must therefore be avoided or mitigated. ***Note: there will be no construction traffic in the RPA.***

Permeability of soil

Any impermeable construction within an RPA will restrict water replenishing the soil. As we have learned from above, trees consume a large volume of water each day. Any restriction in water getting to the root system will quickly affect the tree. Any paved areas within an RPA should therefore be permeable.

Recommendations

There is a direct proportional relationship between a tree's roots and its aerial parts and since the majority of tree roots occur in the upper 600mm of the soil horizon this balance can easily be upset by even shallow excavation and/or soil compaction. Root damage can result in instability or premature decline which may not manifest for a number of years, often long after development has been completed.

To avoid damage to their roots, the tree(s) to be retained will be protected using protective barriers as detailed in British Standard 5837, (2012), '*Trees in Relation to Design, Demolition and Construction'.*

Recommendations' and as indicated in ***Figure 3*** below.

Such barriers will be erected around the Root Protection Area (RPA) prior to the commencement of the construction activity; it will remain in situ and intact until completion. The area within these barriers will be considered sacrosanct, and no work will be permitted within them. In an effort to ensure the tree protective barriers remain during construction, the barriers will carry signage as per ***Figure 3 below*** and that the Site Operatives will be briefed accordingly on induction using the Briefing Notes, *Appendix A – Excavation in Root Protection Area and Appendix B - Rare Demetia Research Centre Baseline Tree Survey and AIA*

How to calculate a root protection area

Guidance for calculation of an RPA is provided in British Standard BS 5837:2012.

In most instances the RPA will be circular centred on the base of the stem. Exceptions to this will occur where existing structures or other factors have restricted root growth in one or more directions. In these cases, expert arboreal advice should be sought to properly define the perimeter of an RPA.

The radius of the RPA will be 12 times the stem diameter. For a single stem tree that is measured 1.5m above ground level, or at the narrowest point below a fork or swelling that occurs within the first 1.5m height.

It is a little more complicated for trees with multiple stems, where a notional combined stem diameter is used.

For trees with two to five stems the combined stem diameter is:

√ ((stem diameter 1) $_2$ **+ Stem diameter 2)** $_2$ **+…. (stem diameter 5)** $_{2)}$

For trees with more than five stems the combined stem diameter is:

√ ((mean stem diameter) $_2$ **x number of stems))**

While the above method adequately covers most trees, arboriculturists suggest that for ancient trees, the RPA should be larger than that calculated using the BS 5837:2012 approach. The Woodland Trust and the Ancient Tree Forum support the ***standing guidance from the Government,*** developed by Natural England and the Forestry Commission, which suggests introducing a buffer zone to provide an extra layer of protection for ancient woodland. The guidance, provided for the assessing of planning applications, proposes that an RPA and buffer zone for ancient trees should have a radius of 15 times the stem diameter or 5m beyond the crown (foliage growth), whichever is greater. The buffer zone should consist of a mix of scrub, grassland, or other semi-natural habitat, and be part of the green infrastructure of the area.

How do you protect tree roots from soil compaction?

To avoid soil compaction and protect tree root systems, we need to keep vehicles, construction machinery and heavy loads away from the area to be protected. When this is not practical, some means of distributing load to reduce ground pressure and avoid surface deformation should be employed.

Tree roots need oxygen to survive, and that requires soil porosity. Any compaction of the soil arising from construction activities or surcharge loading must be avoided within RPAs.

Where it has been agreed that construction activity needs to take place within an RPA, some form of ground protection must be put in place to prevent soil compaction. There are a range of approaches available.

For temporary storage, scaffold platforms can be constructed that bridge over the RPA. For temporary access, metal, concrete or plywood plates can be used to spread the load. Geocells can be used to create a stiff platform. The use of geogrids may also be considered by Ark Build PLC, provided they are designed to create mechanically stabilised layers capable of distributing load without deformation. More on this later.

For permanent hard surfaced areas, where these are unavoidable, site-specific arboreal advice is essential. The design should require no excavation or soil removal and loading needs to be distributed to avoid localised compaction. Drainage, designed to avoid root damage within the RPA, should be considered where waterlogging may occur as a result of the construction. Appropriate and effective subbase support options may be used within the RPA to distribute loads, reducing load concentration that would result in localised soil compaction.

Due to the nature of the scaffolding structure to be erected and dismantled in the RPA, a high visibility barrier fencing secured with timber stakes (Image supplied by Honesty & Faith Hardware Products Co. Ltd). Scaffolding works within RPA will be as per Figure 4 below.

Figure 3 - Tree Protection Barrier

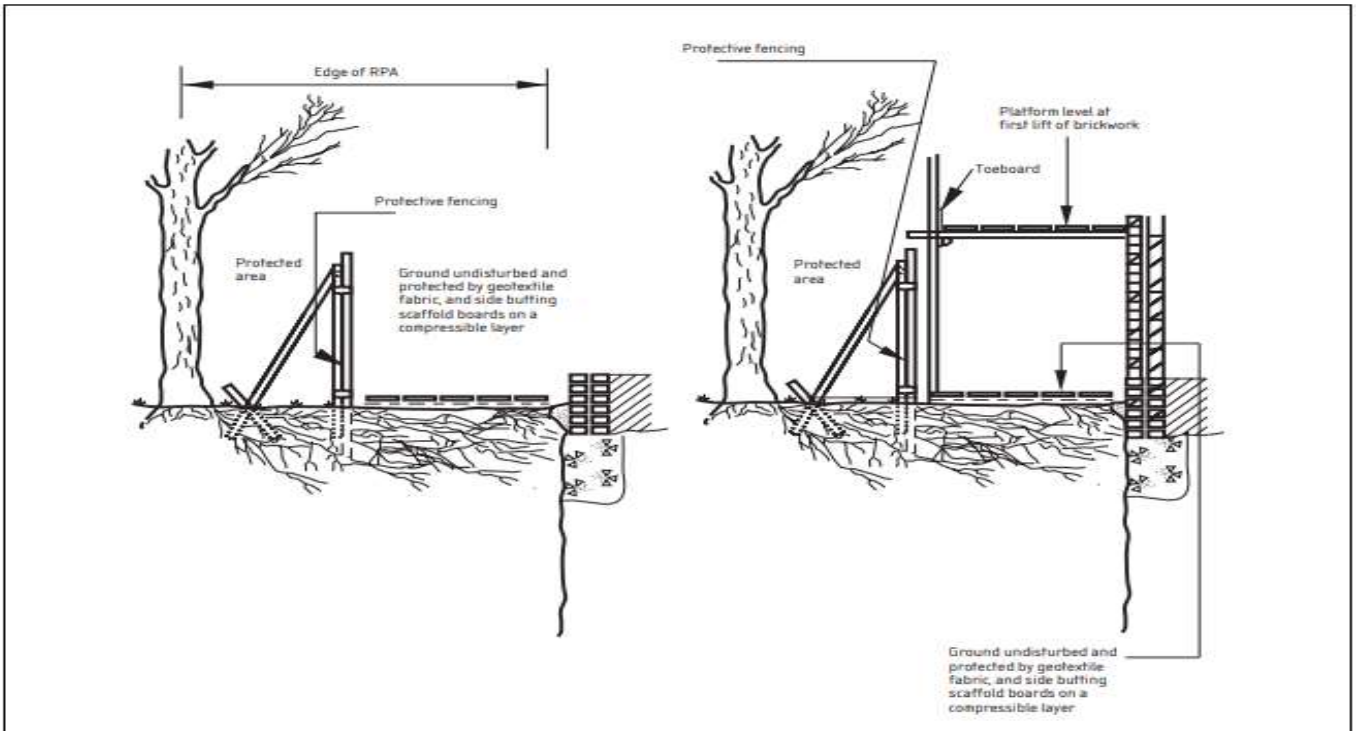


Figure 4: Scaffolding with RPA

British Standard BS 5837 (2012) – 'Trees in Relation to Design, Demolition and Construction Recommendations'

Figure 5 - Barrier Notice

Within the RPA, the following restrictions shall apply:

- NO mechanical digging or scraping
- NO storage of heavy plant machinery
- NO vehicular or plant access
- NO fire lighting
- NO washing down of vehicles or machinery
- NO handling, discharging or spillage of any chemical substance including cement washings
- NO action likely to cause localised waterlogging
- NO changing of ground levels (unless agreed by the LPA)
- NO earthworks

Note: hand digging methodology in accordance with the underground service method below can shall be employed on site by Ark Build PLC during the landscaping or gardening works in consultation with the project arborist who will provide details of site visit log and inspection reports throughout the works in compliance with the Arboricultural Impact Assessment Report.

Underground services or works within the RPA

There are no known underground services to be constructed or dug within the RPA as part of our project works. However, the following precautions should be taken if the scope of works changes and services are to be dug and installed through the RPA:

Conventional trenching is highly likely to damage or sever any tree roots present, which would be unacceptable. Therefore, service runs should not be installed within the RPA unless it cannot be avoided.

Wherever possible, service runs for utilities should be kept together in one trench, and the installation of the trench dug using appropriate methods to minimise damage to tree roots within the RPA. Consultation with the project arboriculturist or the Local Planning Authority (LPA) Arboricultural Officer must take place prior to installation of service runs where there is uncertainty on the potential impact on retained trees.

The preferred method for exposing tree roots in service trenches is by use of an air-spade, and hand-digging methodology which removes soil without damaging roots. Utilities can then be threaded underneath the roots and backfilled with the soil removed (if this is deemed possible by the construction team). An alternative method is by using a 'trenchless technology' (i.e. micro-tunnelling, surface launched directional drilling, pipe ramming or impact Moling), which installs a run underneath the level of the majority of tree roots.

The National Joint Utilities Group (NJUG) Publication – (https://streetworks.org.uk/resources/publications/) can be consulted for general guidance on installing utilities in proximity to trees.

Key points about using an air spade in a root protection area:

- **Minimized root damage:**

The air spade uses compressed air to create trenches, significantly reducing the risk of directly cutting or damaging tree roots compared to traditional excavation methods.

- **Precise placement:**

Allows for careful placement of pipes or cables within the trench, avoiding unnecessary disturbance to the surrounding soil and root system.

- **Suitable for sensitive areas:**

Particularly beneficial in areas with dense root networks or where other underground utilities are present, as it minimizes the risk of damaging existing services.
Other considerations for underground services in a root protection area:

- **Root barrier installation:**

In some cases, a physical root barrier can be installed alongside the service trench to further prevent tree roots from encroaching on the utility line.

- **Careful trench design:**

Ensure the trench is narrow and only as deep as necessary to accommodate the service, minimizing soil disturbance.

- **Expert consultation:**

Further consultation with the qualified project arborist or tree specialist to undertake the works as per the specific needs of the tree and determine additional preventative, control measures and the most appropriate method for installing underground services within the root protection area.

Appendix A – Briefing Notes (Excavation in Root Protection Areas)

Appendix B - Rare Demetia Research Centre Baseline Tree Survey and AIA